

Claims

1. Multiple-stage drilling tool with chip groove for drilling different bit diameters as required, which increase from stage to stage, **characterised by** a first bit stage (1-1) designed as core bit, and at least one second bit stage (1-2, 1-3) arranged above it in the form of a step, where a hole can be drilled by the core bit leaving an uncut cylinder-shaped drilling core.

2. Arrangement in accordance with claim 1, **characterised in** that all the bit stages (1-1, 1-2, 1-3) have at least one common chip groove (S1, S2, S3, S4, S5).

3. Arrangement in accordance with claim 2, **characterised in** that the chip groove has an even or an arched base.

4. Arrangement in accordance with claim 2, **characterised in** that the chip groove has flanks of unequal height.

5. Arrangement in accordance with claim 3, **characterised in** that the chip groove has flanks of unequal height.

6. Arrangement in accordance with claim 2, **characterised in** that at least one flank of the chip groove is vertical or diagonal to the groove base.

7. Arrangement in accordance with claim 3, **characterised in** that at least one flank of the chip groove is vertical or diagonal to the groove base.

8. Arrangement in accordance with claim 4, **characterised in** that at least one flank of the chip groove is vertical or diagonal to the groove base.

9. Arrangement in accordance with claim 2, **characterised in** that at least one groove flank is rounded.

10. Arrangement in accordance with claim 3, **characterised in** that at least one

groove flank is rounded.

11. Arrangement in accordance with claim 4, **characterised in** that at least one groove flank is rounded.

12.. Arrangement in accordance with claim 1, **characterised in** that the path of the chip groove on the multiple-stage drilling tool, with the increasing diameter of successive bit stages, runs in an imaginary cone with virtually the same groove depth.

13. Arrangement in accordance with claim 2, **characterised in** that the path of the chip groove on the multiple-stage drilling tool, with the increasing diameter of successive bit stages, runs in an imaginary cone with virtually the same groove depth.

14. Arrangement in accordance with claim 3, **characterised in** that the path of the chip groove on the multiple-stage drilling tool, with the increasing diameter of successive bit stages, runs in an imaginary cone with virtually the same groove depth.

15. Arrangement in accordance with claim 2, **characterised in** that the course of the chip groove is spiral-shaped or straight.

16. Arrangement in accordance with claim 3, **characterised in** that the course of the chip groove is spiral-shaped or straight.

17. Arrangement in accordance with claim 15, **characterised in** that the chip groove of each bit stage is a spiral-groove segment smaller than a quarter of a full spiral turn.

18. Arrangement in accordance with claim 16, **characterised in** that the chip groove of each bit stage is a spiral-groove segment smaller than a quarter of a full spiral turn.

19. Arrangement in accordance with claim 1, **characterised in** that the core bit of the first bit stage has cutters running continuously from the inside to the outside.

20. Arrangement in accordance with claim 1, **characterised in** that the core bit of the first bit stage (1-1) has inner cutters (Ci1) and outer cutters (Ca1), where the outer cutters (Ca1) are located in the area close to the bore of the heels (F1 to F5) which are adjacent to the chip groove (S1 to S5), and the core bit has U-shaped notches (E) in the area close to the bore between two heels (F1 to F5), and an inner cutter (Ci1) is assigned to each notch (E).

21. Arrangement in accordance with claim 20, **characterised in** that the core bit of the first bit stage has at least one other cutter in addition to the inner and outer cutter, which is arranged in the area of the above-mentioned inner and outer cutters.

22. Arrangement in accordance with claim 20, **characterised in** that the clearance angle (α_1) of the outer cutter of the core bit measures between 6 and 15 degrees.

23. Arrangement in accordance with claim 1, **characterised in** that from the second bit stage (1-2, 1-3) onwards, each bit stage has at least one outer cutter (Ca2, Ca3), whose clearance angle (α_2) is less than or equal to 10 degrees.

24. Arrangement in accordance with claim 23, **characterised in** that the clearance angle (α_2) of all the outer cutters (Ca2) from the second bit stage (1-2) onwards are equal.

25. Arrangement in accordance with claim 23, **characterised in** that the outer cutter (Ca2) from the second bit stage (1-2) is at an angle α_3 of between 0 and 45 degrees to an imaginary horizontal plane.

26. Arrangement in accordance with claim 20, **characterised in** that, on the core bit, the clearance angle of the inner cutter is between 5 and 10 degrees.